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THE HISTORY AND CONSTRUCTION
OF
PAINT BRANCH GORGE BRIDGE,
MONTGOMERY COUNTY, MARYLAND.

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MAY 3, 1935

SUMMARY

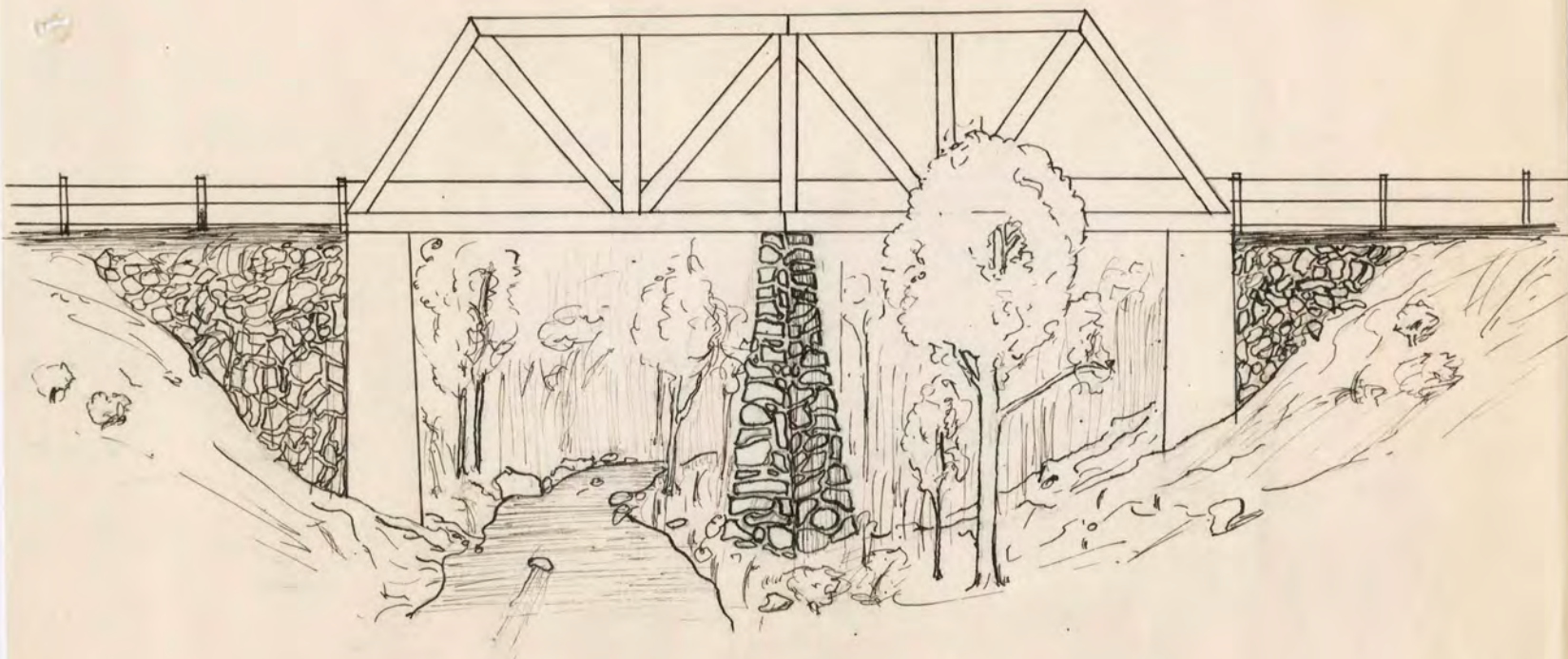
Columbia Pike between Whiteoak and Burtonsville crosses a deep, wide ravine at the bottom of which runs Paint Branch. The bridge across this point of the stream is called Paint Branch Gorge Bridge because of the nature of the stream bed and ravine. The gorge is approximately two hundred feet wide and forty-five feet deep. Prior to 1920, Columbia Pike was a county road, and the first bridges to span the gorge were built by Montgomery county.

There have been four bridges across this part of Paint Branch. First, a wooden truss bridge was built (date of construction unknown); this was replaced in 1907 by an iron girder bridge on the same piers. In 1912 a reinforced concrete arch bridge was constructed thirty-five feet upstream, which marvel of civil engineering carried America's fast-growing traffic until 1930, when the Maryland State Roads Commission decided that the bridge must be widened. This was done, and since that time a wide, concrete arch bridge gracefully spans picturesque Paint Branch Gorge.

ORIGINAL BRIDGE

The first bridge across the gorge was a wooden truss bridge. Its foundations consisted, as may be seen in the sketch and in several of the photos, of two abutments and a center pier. Four and one-half feet concrete retaining walls, filled in behind with earth and granite, made up the abutments. The center pier was simply a granite rock wall.

This structure was finally considered unsafe in 1907, when the old wooden truss was removed, and the height of the abutments and pier was increased three feet by caps of reinforced concrete. This concrete still appears in sound condition. At the top of the center pier, the mortar looks much better than at the bottom, which is crumbling. The top of the pier must have been strengthened when the concrete caps were put on. An iron girder bridge was then erected. The engineers who designed this bridge apparently didn't look far enough ahead, for as time went on, heavier loads were applied, and in 1912 a new bridge was considered necessary. Only the abutments and center pier of the original structure remain, and these are gradually becoming overgrown with bushes and trees.



AUTHOR'S CONCEPTION OF ORIGINAL BRIDGE

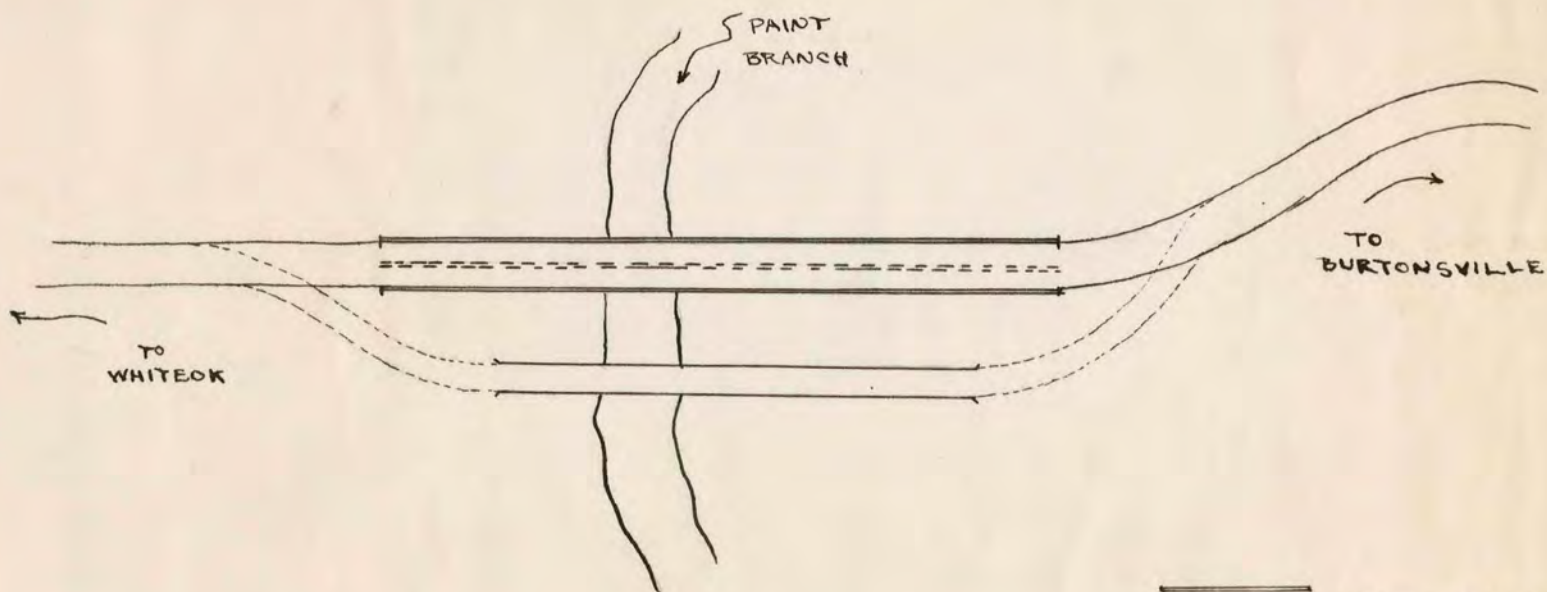


DIAGRAM OF ROADWAYS

- PRESENT BRIDGE
- - - - - 1912 BRIDGE
- ORIGINAL BRIDGE



ORIGINAL BRIDGE, FROM TOP OF NEW



VIEW TOWARDS BURTONSVILLE

1912 BRIDGE

A Luten Arch bridge was built in 1912 by the Luten Engineering Company, Indianapolis, Indiana. This was built thirty feet north of the original structure. The road level is approximately twenty-five feet above the old. This bridge, narrow as it was, constituted a great improvement over the original one.

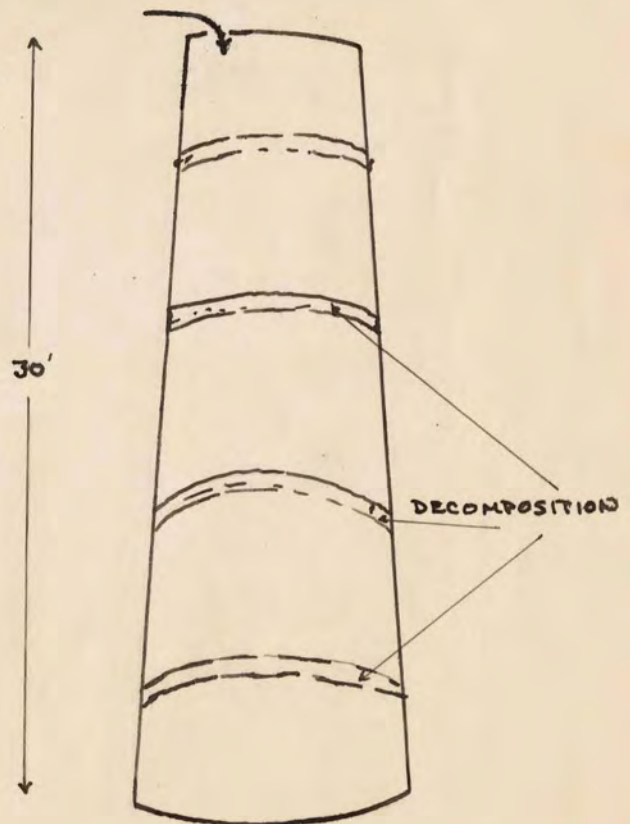


VIEW LOOKING UPSTREAM

WIDENED BRIDGE

In 1920 Columbia Pike became a state road, and the Commission was authorized in 1930 to widen the original 1912 Luten Arch Bridge to twenty-seven feet. A bid was accepted from the T. D. Claiborne Contracting Company for \$16,137.50. Mr. S. S. Steinberg, of the Commission, inspected the existing bridge and submitted his report.

He stated that the foundations had been laid on large boulders chipped flat. The concrete in the piers was in dubious condition in parts of the surface, though holes for dowels showed the interior (which contained some one-man stone) to be sound. Apparently the piers had been poured from the tops of the forms and piled up, as shown in the sketch. Run-of-bank aggregates, containing much fine, inert matter, had been used in the concrete. Laitance resulted, causing several unsound places in the concrete.



The report continued to say that the rest of the bridge, abutments, arches, footings were in satisfactory condition. The grains of the wood from the forms still showed in most of the concrete. Mr. Steinberg recommended that a 9" jacket of concrete about the existing pier would take care of their trouble. This was later changed to 18".

There was much vibration on the bridge, for cars coming down the hill from Whiteoak would jar it. It was decided that by widening the existing bridge the structure would be stiffened sufficiently to take care of any vibration.

Plans were then drawn up by the State Roads Commission under the direction of Mr. W. C. Hopkins, bridge engineer, Baltimore, Maryland. Construction started July 5, 1930. Mr. Gus Mencken, brother of H. L. Mencken, noted writer and critic, was superintendent of the construction work, representing the T. D. Claiborne Company. Mr. H. D. Williar, Jr. was chief engineer; Mr. W. C. Hopkins was bridge engineer; Mr. E. P. Owings, a graduate of the University of Maryland, was state inspector on the job.

First, the existing piers were encased with an 18" jacket of concrete; one inch round rods with a washer and nut on each end were placed at five feet centers both ways. A new coping was built on the existing downstream rail, and a new curbing put in. One-half inch square rods were used to bind these to the existing concrete.

The upstream rail, which of course was to be removed, was left on until last, and only chunks knocked out to allow for the pouring of concrete. This particular job was made easier by the existence of the original bridge from which forms could be built, concrete poured, and general work executed.

The piers and abutments were poured first down reverse chutes as shown in photograph 1. All the concrete was measured by volume proportions in wheelbarrows--a practice then allowed but now practically obsolete. Concrete was mixed in a one-bag mixer and carried to the chutes in two-wheel Georgia buggies. One of these may be seen in snapshot 2.

At the base of the pier near the Burtonsville side, there was a great boulder. To dynamite this would endanger the existing pier, to chip it flat would involve much trouble and expense, so it was covered with a block of concrete which is not exactly in harmony with the shape of the pier (photo 3) but allowed the new pier to be built on it. Exceptional care was taken in the placement of the long three-quarter inch round rods @ 12" c-c which extended a quarter length of the arch and far down into the pier.

The plans show the size of the abutments "if rock is not encountered". Rock, was encountered, however; soft on the Whiteoak side, and hard on the Burtonsville side, but strong enough footing



1. CHUTES



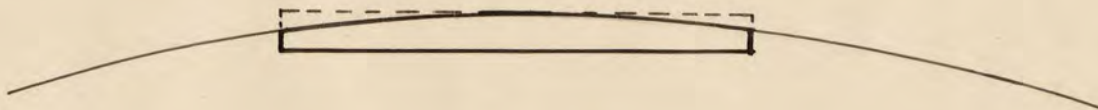
2. APPARATUS, MATERIALS

for the abutments. Revisions of the plans for the wings were made in the field. The plans show the upstream wings with the note, "Length and direction of wing is tentative; shall be built as directed to suit field conditions". These conditions called for an angle more approaching the perpendicular on the Whiteoak side, and just about perpendicular on the Burtonsville side.

After the piers and abutments were completed, the scaffolding was built up, and forms placed for the arches. The forms were required to exactly fit the curvature of this particular type of Tuten arch, so they were built in an open field near the job in the following manner:

A center is picked, from which an arc with a radius of 54' 11" is swung for a distance of 10'3" on one side, say the left, and 12'2" on the other, the right. Along the radii to these points new centers are placed with new radii, 44'0" on the left, and 46'9" on the right, swung for distances of 23'6" and 32'5" respectively from the original middle point of the arch. Finally, centers are placed on the radii to these points and short arcs with radii of 4' are swung to complete the arch. This description fits the end arches whose end elevations are not the same. The center arch has different values for radii, but has both ends on the same elevations.

After the curve of the arch is drawn on the ground, boards are laid down and cut to fit it thus:





3. PIER ON BURTONSVILLE SIDE



4. STEEL IN THE ARCH

These boards ran lengthwise with the span, and supported 6" toe boards running perpendicular to the span. Steel was then carefully laid (photo 4), and finally the concrete was poured.

In the first concrete bridge, no allowance was made for drainage, so in the new arches, 4" round tile drains were set to take care of rainwater, etc.

The one-half square bars at 2' centers measured along the intrados were bent up to go in the inside face of the spandrels. Expansion joints with $\frac{1}{2}$ " felt were placed at approximately third points of the spans in the rail, and two (4' apart) were introduced down to the arch ring above the piers. No tar paper was permitted. Ties, as seen in the plans, of two types, A and B, were used to hold the new arches to the old. After the arches and spandrels were formed and set, the old upstream rail was removed, and the arches filled with neighboring rock and earth. The road was then built on this.

Construction was entirely completed just before Thanksgiving, 1930; the total cost of all work was \$16,926.34; \$788.84 above the original bid, which was close enough to be satisfactory.

Two bronze plates, one in each rail, may be seen with this inscription:

PAINT BRANCH GORGE BRIDGE
WIDENED IN 1930 BY STATE ROADS COMMISSION
G. Clinton Uhl - Chairman
Howard Bruce
John K. Shaw
H. D. Williar - Chief Engineer
W. C. Hopkins - Bridge Engineer



VIEW TOWARD WHITEOAK



VIEW OF ROADWAY

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Information was gathered for this thesis from the following sources:

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County Engineers, Silver Spring, Md.
Harry L. Miller, Resident near bridge.
- 1912 Bridge - Attempted to obtain information from
Luten Engineering Company, but letter
unanswered. L.B. Johnson, State Roads
Commission, Baltimore, Md.
- Widened Bridge - L.B. Johnson, State Roads Commission,
Baltimore, Md.
E. P. Owings, State Roads Commission,
Hyattsville, Md.

THE FUTURE

Before the Claiborne Company undertook this job, they agitated the Commission about constructing an entirely new bridge instead of merely widening the old one. The State Planning Commission might have done wisely in heeding this suggestion, for the Columbia Pike is under consideration for carrying a new east coast boulevard from Washington to points north of Baltimore. The present six-lane Washington-Baltimore boulevard is insufficient to carry the very heavy traffic it now does, and may expect to carry, so a new route is being carefully considered. If this new route runs across Paint Branch Gorge, the interesting history of bridges at this point will be made more interesting by perhaps a more ingenueous and a more beautiful type of bridge. 4?